



National Environmental
Research Program

NERP Tropical Ecosystems Hub

Monitoring and Evaluation Plan

FINAL – 1 October 2012

Prepared by the
Reef and Rainforest Research Centre

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1. Purpose

The National Environmental Research Program (NERP) is an Australian Government program that provides funding for applied public good research. It builds on the Commonwealth Environment Research Facilities (CERF) program with a specific focus on biodiversity. The NERP Tropical Ecosystems Hub (NERP TE Hub) will build on a \$25.8m investment from the Australian Government through the National Environmental Research Program to deliver \$61.9m of research for North Queensland. The Hub's mission is to deliver world-class research and shared knowledge for the benefit of three geographic Nodes (Great Barrier Reef, Torres Strait and tropical rainforests).

As a major investment of public monies, it is essential that all stakeholders can track the outputs and outcomes generated by the Hub and be in a position to evaluate its successes. The strategic goals of the NERP TE Hub are highlighted in Box 1 below.

This **Monitoring and Evaluation Plan** complements other documents, including the NERP TE Hub Science Communication Plan, and describes how the Hub Steering Committee will monitor key performance indicators in order to advise DSEWPaC on Hub progress in a timely manner through biannual reporting of:

- Project milestone delivery;
- Expenditure and commitment; and
- Communications including engagement and knowledge transfer.

Box 1: The strategic goals of the NERP Tropical Ecosystems Hub are to improve understanding and delivery of knowledge relating to:

1. **Monitoring condition and trend in natural resources:** Understanding the condition, trend and interdependencies of unique environmental assets of the North Queensland region; building the capacity to predict the future for these resources.
2. **Understanding the impacts of cumulative pressures on ecosystem function:** Understanding how ecosystems and biodiversity respond to cumulative pressures; determining the ecological, social and economic implications for North Queensland.
3. **Managing for resilient tropical systems:** Partnering with key environmental decision-makers in government, industry and community to develop information, systems and tools to implement ecologically-sustainable management; preserving environmental values while strengthening social resilience to future change.
4. **Delivering an effective and efficient program:** Implementing a cost-effective program by ensuring a clear governance framework is supported by effective systems and efficient processes that deliver: world-class science; timely results; value for money; clear pathways for adoption of new information by all engaged end-users.

2. Expected Outcomes

Beneficial outcomes would include strengthening evidence-based decision making by major research users such as the regional management agencies [Great Barrier Reef Marine Park Authority (GBRMPA), Torres Strait Regional Authority(, TSRA), and Wet Tropics Management Authority (WTMA)], informing policy formulation by all levels of government, and facilitating discussions about sustainable development in the regions by building the knowledge base accessible to local industries, NGOs, and the regional communities. These aspirations require effective transfer of knowledge from the research community to diverse interests, each with different needs potentially requiring different strategies.

The Multi-Year Research Plan (MYRP)¹ describes a multidisciplinary, multi-institutional program delivering 38 research projects in three themes (consistent with the Hub Strategic Goals; see Box 1) cutting across the three geographic Nodes. The details of these projects (resources and methods) are available in the Annual Work Plans, however the MYRP summarises (in tabular form) the expected outputs from each project and translates them into more than a dozen examples of useful outcomes, namely:

- Greater clarity about the condition and trend of the key environmental assets;
- New knowledge about historical changes in the GBR coastal zone;
- Better definition of threatening processes in tropical terrestrial and marine ecosystems;
- Management based on understanding multiple risks and cumulative pressures;
- Inclusion of the socio-economic values of ecological goods and services in environmental decisions in North Queensland;
- Enhanced capacity and capability in North Queensland to support evidence-based decisions around competing resource uses, coastal development, invasive species and climate change;
- Better informed management of species of high conservation concern (cassowaries, turtles, dugongs, sharks);
- Greater participation by Indigenous stakeholders in co-management of biodiversity;
- Support for ecologically sustainable communities in the Torres Strait;
- Actions to maintain intact ecosystems with uncompromised natural resilience to change including climate change;
- Improved ability to predict ecosystem and societal responses to future change;
- Better tools to evaluate alternative response scenarios;
- Improved flow of clear and appropriately targeted information to North Queensland's diverse communities, including Indigenous communities; and

¹ <http://www.environment.gov.au/biodiversity/science/nerp/publications/pubs/tropical-ecosystems-myrrp.pdf>

- Evidence of real-world impacts of Hub research on policy and on-ground practice in addition to a list of scholarly publications.

The last outcome statement from the MYRP sets both the context and the challenge for the NERP TE Hub Monitoring and Evaluation Plan. Effective engagement is critical to successful delivery and eventual influence of the Hub. The Hub intends to transfer new knowledge and tools (e.g. decision support systems) to managers and other users requiring environmental, social and/or economic information to support their respective future decisions. Thus, the NERP TE Hub will include among its key performance indicators the uptake of knowledge generated by research co-equally with the generation of new understanding and the efficient use of public resources.

Reporting against the Monitoring and Evaluation Plan will be on a biannual (six-monthly) basis and include operational indicators such as:

- Project milestone delivery (including key performance indicators);
- Finances; and
- Communications and engagement activities.

3. Links to other Hub Plans

The Monitoring and Evaluation Plan is the last of four documents that describe the NERP TE Hub. The other three – Multi-Year Research Plan, Annual Work Plan and Science Communication Plan – describe the intent and delivery of the research program and desired knowledge transfer to research users. The Monitoring and Evaluation Plan describes the checks and balances that guide Hub investment and report progress towards delivery of Hub Goals to the Program’s major stakeholder (the Australian Government).

4. Three Phases of Implementation

DSEWPaC required the NERP TE Hub to develop key performance indicators for three phases of program implementation:

1. **Systems establishment phase**² – assesses how well the Hub has implemented the systems required to successfully deliver on the NERP Hub MYRP. These indicators will become obsolete following the first year of funding.
2. **Outputs delivery phase** – provides confidence that the Hub is delivering research outputs intended for input into the policy development process.

² Once all system establishment indicators have been delivered, no further reporting will be required. Over time, reporting against outputs delivery phase indicators will diminish in importance as the focus changes from achieving outputs to outcomes.

- 3. Project impact phase** – will reveal how well the Hub has delivered outcomes, i.e. demonstrate that Hub research has had a positive and demonstrable effect on the policy issues managed by the department and other Australian Government agencies and resource management organisations specified in Hub work plans. It is recognised that many, but not all research outcomes occur after programs have been completed.

Table 1: NERP Key Performance Indicators, anticipated period of relevance, reporting mechanism and current status developed by DSEWPaC.

Indicator		Timing	Reporting Mechanism/Status
Systems Establishment Phase Indicators[†]		1 Jan 2011 to 1 Jan 2012	
A1	Develop and have approved a Multi-Year Research Plan	July 2011	Submitted 7/7/2011 and approved by the Minister in September
A2	Develop and have approved the first Annual Work Plan	July 2011	Submitted 7/7/2011 and approved by DSEWPaC in September
A3	Established and fully resourced knowledge brokering and communication plan	Nov 2011 (TE Hub is 1 Oct)	Submitted 3/10/2011
A4	Knowledge broker and communications specialists employed	By Dec 2011	RRRC staff in place
A5	Established and fully resourced monitoring and evaluation plan	Nov 2011	Submitted 24/10/2011 to TE Hub Steering Committee
Outputs Delivery Phase Indicators[#]		July 2011 to June 2014	
B1	Number and description of stakeholder workshops with Departmental/ portfolio staff;		Biannual Report Stakeholder contacts will be streamlined through four Implementation Groups (Science Communications Plan) and DSEWPaC will be invited to each meeting
B2	Number and description of stakeholder workshops with parties external to the department		Biannual Report Stakeholder contacts will be streamlined through four Implementation Groups (Science Communications Plan) and DSEWPaC will be invited to each meeting
B3	Papers being published according to (or in excess of) the work plan		Biannual Report
B4	Research outputs provided to end users on time and as identified in the		Biannual Report

Indicator		Timing	Reporting Mechanism/Status
	work plan		Stakeholder contacts will be streamlined through four Implementation Groups (Science Communications Plan) and DSEWPAC will be invited to each meeting
B5	Number of cross-disciplinary meetings held between Hub consortium members, and with other NERP Hubs, to further Hub objective		Inter-Hub contacts will be co-ordinated through and reported by the Hub Science Leader as part of the Biannual Report
B6	Research information (i.e. data and metadata) made accessible to other users in accordance with the NERP Guidelines and the funding agreement		Biannual Report will include information about web statistics. The administrator will also establish program-level data management protocols that facilitate data capture and management in accordance with any Departmental requirements and oversee arrangements for the timely exchange of data between research projects. A draft of this protocol is presented in Attachment A .
B7	Successful achievement of the Annual Review and “Pathways to Impact” analysis		Hub Steering Committee will review and report on KPI
B8	Management Performance Indicators		Hub Steering Committee will review and report on KPI
B9	Successful achievement of milestones specified for each project within the NERP TE Hub – rate of slippage.		Biannual Reports
Project Impact Phase Indicators		Jan 2012 to June 2014	
C1	Examples of research outputs being cited by Government as evidence that policy change is required. ‡		Reported by government stakeholders to the Science Leader and Administrator for incorporation into Biannual Reports and Final Report
C2	Examples of Government policy being changed as a direct result of research outputs.*		Reported by DSEWPAC to the Science Leader and Administrator for incorporation into Biannual Reports and Final Report
C3	Examples of useful capacity built within the Australian Government as a direct result of Hub activities.*		Reported by DSEWPAC to the Science Leader and Administrator for incorporation into Biannual Reports and Final Report
C4	Research citations appearing in other researcher’s papers.		Science citation analysis by Administrator and Science Leader and reported through the Steering Committee.

Indicator		Timing	Reporting Mechanism/Status
C5	'Pathway to Impact' analysis		Reported by Researchers and Research Users through the Implementation Groups to the Administrator for incorporation into the Annual Work Plans and Final Report. Hub Steering Committee will review and report on KPI
C6	Website statistics, number of downloads of reports, number of subscribers to RSS feeds and e-newsletters		Biannual Reports
C7	Media monitoring will be undertaken by the communications units in stakeholder and research provider agencies.		Reported by stakeholders to the Administrator for incorporation into Biannual Reports
C8	Number of examples where research outputs have been utilised by Industry for 'Best Practice' management policy or 'green' accreditation arrangements†		Reported by Industry stakeholders to the Science Leader and Administrator for incorporation into Biannual Reports and Final Report
C9	Successful completion of the Communication and Engagement Evaluation		Evaluation through consultation of key research users by the Administrator for input to the Hub Final Report
C10	Integration of NERP research with other programs		Synthesis of results, joint messaging and combined meetings and conferences incorporated into Biannual Reports and Final Report.

† Plans and systems specified by these indicators have been approved, established and resourced. On development of the Second Annual Work Plan (2012-2013), it will be appropriate to review the NERP TE Hub MYRP and Science Communication Plan to ensure consistency. Each of these plans will be considered a living document.

A range of systems will be put in place to facilitate uptake of research outputs to end users however in many cases this uptake is beyond the control of the researchers.

‡ These activities align with activities outlined in the NERP TE Hub Science Communication Plan.

* The Department understands that research outputs are only one of several inputs into policy decision making. It is not intended for research Hubs to be accountable for their research being implemented directly as policy. However, research outputs must be made available to policy makers in accordance with the milestone deliverables and outcomes specified in the hub MYRPs and AWP.

Systems Establishment Phase

The purpose of these core indicators (Table 1 A1 to A5) is to ensure that the Hub has been established in a form that enables effective and efficient program delivery.

The NERP TE Hub has a **Steering Committee**, with an independent Chair and diverse stakeholders, that oversees and approves all significant actions; a **Science Leader** who has guided and endorsed the portfolio of research projects developed through Node Working Groups established by the Hub Steering Committee; an **Administrator** who is responsible for the delivery of multiple operational documents [MYRP, AWP, Science Communication, and Monitoring and Evaluation (this document)] describing aspects of the Hub's development.

Outputs Delivery Phase

The purpose of project delivery indicators (Table 1 B1 to B6) is to monitor progress of the research projects and the Hub operations.

The monitoring of Output Delivery Phase indicators is to inform the Steering Committee about the effectiveness of mechanisms for project management and about outputs from the research program. This feedback is required in a timely manner that allows the Hub to adapt its processes in response to the key performance indicators (Table 1 B1 to B6).

Management Performance Indicators

The effectiveness of the Hub management systems requires regular surveillance. Review is required to ensure that management systems do not inhibit or retard the performance of the research projects.

Specific performance indicators for management of the NERP TE Hub could include:

- Timely delivery of informative biannual reports;
- Timely and accurate financial management;
- Adherence to the Commonwealth Grant Guidelines and audit requirements;
- Satisfactory delivery of milestones;
- Timely resolution of disputes.

Milestone delivery assessment

All projects will have measurable milestones that allow accurate tracking of progress by the Hub Administrator.

The Annual Report will include the percentage of milestone reports not delivered on time and of standard (performance slippage). For example, the CRC Reef averaged 23-30% slippage; the MTSRF averaged 3% slippage.

The Hub Administrator will track progress of each project by monitoring the delivery of agreed milestones. If the output delivered to the Administrator clearly meets or exceeds quality standards, this information will be included in the reporting stream. Performance indicators for each project will be determined by the appropriate Implementation Group and included in the milestone reporting.

If the output delivered to the Administrator is considered to be unsatisfactory, it will be referred to the Hub Science Leader for consideration and potential rectification. If the Project Leader disagrees with the subsequent judgement and action, a dispute resolution process is available.

Biannual (6 month) progress report





Biannual Progress Reports will be prepared by the Administrator, reviewed by the Science Leader, and endorsed by the NERP TE Hub Steering Committee prior to delivery to DSEWPaC for approval.

Biannual reports provide project performance information for all aspects of Hub projects. These reports also provide information on the contribution of projects to meeting the specified policy needs. The biannual reports will use a traffic light approach (Box 1) to indicate project progress.


On return of such approval, the Hub Management Committee (departmental representatives, Hub Science Leader, and Hub Administrator) may recommend to the departmental delegate the release of funds to research providers for the next research period.

Box 1: Project Progress ‘Traffic Light’ Report Card.

These outputs and outcomes record progress for each project against the milestones identified in the relevant Annual Work Plan. Progress is outlined against the milestones. Project Status is assessed against the following indicators:

	Red: There are significant difficulties or risks emerging which may compromise the project. Immediate remediation is required.
	Amber: There are real or potential difficulties and risks which should be brought to the attention of the department and other stakeholders even if the project is being well managed.
	Green: Project is on track or only requires minor refinement; there are no significant difficulties and/or risks emerging.
	Blue: Task has been completed.

Box 2 (cont'd): Project Progress 'Traffic Light' Report Card.

For example: Project 1.1 Yeti habitat requirements evaluation		
	Reconnaissance field trips, including initial engagement with managers and other stakeholders.	Two reconnaissance field trips undertaken to the most recently reported Yeti lairs, with a further two field trips in the planning stages. Habitat requirements recorded. Meetings held with the CEO of the ACT Yeti Society and representatives of the Canberra Sceptics Association.
	Workshop on conceptual and technical approach.	Potential researchers/attendees identified and scoping paper drafted. Possible locations for workshop contacted and request for quotes sought.
	Beginning of compilation of existing data	Scoping begun. No data collected as yet. Due to commence 10 December

Annual review and 'Pathway to Impact' assessment

In addition to biannual reports, the NERP TE Hub Steering Committee will review the performance of the Annual Work Plan each year. This provides an opportunity for the Steering Committee, with advice from the Implementation Groups and the Science Leader, to undertake an annual review of the research program based on research quality, project progress and performance, and research-user relevance.

On an annual basis, starting in late 2012, the output of each project will be reviewed by researchers and research-users in the appropriate Implementation Group. This evidence of the dissemination and uptake of Hub outputs will be included in the next Biannual Report to DSEWPaC.

The annual review will also consider the overall performance of the Hub against the anticipated outcomes identified in the Multi-Year Research Plan. This information will inform the next Annual Work Plan. The process will assist in informing future Annual Work Plans and allow for direct input/feedback from research-users to researchers and the Hub Administrator. The outcomes will enable project milestones to be updated or redirected.

Project Impact Phase

The purpose of project impact indicators (Table 1 C1 to C6) is to monitor progress towards effective knowledge transfer of Hub research to appropriate research-users.

Projects in the NERP TE Hub will be monitored by four Implementation Groups (each with strong research-user membership) that will meet biannually with the Hub Science Leader and relevant Program and Project Leaders. The Program Leaders will oversee projects between consecutive meetings (NERP TE Hub Science Communications Plan).

In late 2012, after a year in which to evaluate progress towards the agreed research milestones, the Implementation Groups will detail at least one specific mechanism of knowledge transfer to an appropriate research-user for each project. This will form the basis of the “pathway to impact” for Hub research and will consist of measureable actions that can be monitored and reported alongside the delivery of remaining research milestones.

Potential examples of measureable indicators of project impact include uptake in:

- The Great Barrier Reef Outlook Report;
- Reporting on management of Australian Government World Heritage Areas;
- The Queensland Government ‘State of the Environment Report’;
- Reef Plan; and
- Queensland Fisheries Regulations.

Other examples include use by industry for developing ‘best practice’ arrangements or use by management agencies in operational decisions.

The success of these knowledge transfers (at project level) will be evaluated in mid 2014 by feedback from the research-users participating in the Implementation Groups and will provide primary input to the final report.

Communication and engagement indicators

Starting in mid 2012, standard metrics of output and engagement will be reported biannually. These could include:

- Publications, reports, newsletters;
- Statistics on visits to the Hub website, number of downloads of reports, etc.; and
- Media monitoring undertaken by stakeholder and research provider agencies.

Engagement by research providers will be reported by indicators including:

- Attendance of research users in Implementation Groups;
- Outreach by Hub participants (e.g. Project and Program Leaders, Hub staff); and
- Meetings and workshops.

Feedback loops and continual improvement

The NERP M&E Plan includes a feedback template (**Attachment C**) for the department to respond to each biannual progress report. Internal monitoring processes (described in this plan) will be important sources of more regular feedback allowing continuous improvement. Ongoing Hub monitoring and evaluation, and day-to-day contact with NERP Team staff, will facilitate the ability of the Hub to improve its processes and better meet its goals.

A review of the performance of the NERP TE Hub Annual Work Plan by the Steering Committee and the department will provide the feedback and adaptation loop for the Multi-year Research Plan. Information collected throughout this monitoring and review process will inform the NERP-wide evaluation to be undertaken by the department. It is scheduled to occur within four years of program commencement.

NERP is scheduled to continue following the conclusion of its first four years. Lessons learnt through the program's M&E process will be a primary source of information to identify improvements to processes and procedures. The department's feedback to the Hub will assist in meeting its obligations and to improve its processes and procedures.

5. Review of this plan

All documents other than the MYRP (e.g. Annual Work Plans, Science Communications Plan, M&E Plan) are living documents that will be reviewed annually and updated as appropriate with information about what works and what doesn't. These changes will be included in the Final Report in order to provide DSEWPac with efficient guidelines for the public administration of future programs like the NERP.



National Environmental
Research Program

NERP Tropical Ecosystems Hub

Monitoring and Evaluation Plan
Appendix A: Data Management Protocol

1 October 2012

Prepared by the
Reef & Rainforest Research Centre

Purpose

The Australian Government's National Environmental Research Program **Tropical Ecosystems Hub** (NERP TE Hub) projects will develop a range of data, interpreted results and communication products.

NERP TE Hub funded recipients are required to make all research outputs publicly available on websites or through other means agreed with the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC). To assist in managing this process, the Hub Administrator, the Reef and Rainforest Research Centre (RRRC), is required to establish program-level data management protocols that facilitate data capture and management in accordance with any Departmental requirements and oversee arrangements for the timely exchange of data between research projects.

The purpose of this document is to outline the principles for data management for the NERP TE Hub, and present options for data capture and presentation. This document aligns with the contractual requirements of research provider institutions and the *Interim Guidance on Data and Information for the National Environmental Research Program*, which was distributed to Hubs by DSEWPaC on 30 September 2011. This Protocol is considered a 'living document' that will be updated as needed, and incorporating any further guidance on data and information management provided by the Department.

NERP TE Hub Data Management

The Hub will implement the following principles in accordance with the *Interim Guidance on Data and Information for the National Environmental Research Program*:

- A. All research outputs will be publicly available on websites with a persistent or permanent link under a **Creative Commons – Attribution Non-commercial 3.0 Australia License** (<http://creativecommons.org/licenses/by-nc/3.0/au>).
- B. All projects will provide compliant **metadata**;
- C. **All project derived data** (including raw data) will be **stored in a managed, enduring repository** (e.g. e-Atlas, JCU Tropical Data Hub, AIMS Data Centre); and
- D. **Data exchange** between projects and related programs will be **encouraged**.

Options for meeting these principles are outlined below.

A. Publicly available information

Public accessibility

In order to meet the conditions of public accessibility as defined by this NERP TE Hub Data Management (DM) Protocol, project derived data (i.e. raw data, research results, outputs and outcomes) must be:

1. Discoverable by interested parties seeking those data and information (i.e. the existence of project data is recorded and advertised in a searchable web-accessible repository); and
2. Accessible in accordance with the Creative Commons – Attribution Non-commercial 3.0 Australia License.

To ensure NERP TE Hub project data are appropriately documented, stored, discoverable and accessible, the Administrator will ensure that Project Leaders of all NERP TE Hub projects:

1. Create and lodge meta-data records (see **Attachment 1**), study site information (see **Attachment 2**) and a project summary (see **Attachment 3**) with the e-Atlas;
2. Store project derived data (raw data and project data products) in a managed, enduring repository (e.g. e-Atlas, JCU Tropical Data Hub, AIMS Data Centre);
3. Supply project data products to the e-Atlas for hosting and web visualisation; and
4. Ascribe Creative Commons – Attribution Non-commercial 3.0 Australia License to research outputs.

This will be achieved by incorporating these activities as specific deliverables in the final annual milestone of each project schedule contracted each year. This will ensure that meta-data are recorded and discoverable, raw data are appropriately stored and that content available on the e-Atlas grows progressively throughout the life of the Hub.

Interpreted results vs. raw data

The Administrator will ensure that outputs and outcomes from NERP TE Hub projects will be recorded, stored and made available to research users in a readily accessible and timely manner. Initial emphasis will be placed on making the **interpreted** results of NERP TE Hub research available within timeframes that are appropriate to ensure maximum utility and adoption by research users. Interpreted results can be presented in numerous formats (e.g. reports, figures, briefings, presentations, GIS files, tables etc). The timeframes and the conditions for the provision of interpreted information can be negotiated by research users and researchers through formal and informal avenues of engagement, particularly the NERP TE Hub Implementation Groups and the project 'buddy' system. This will facilitate the Hub mission to deliver research that supports evidence-based policy, management and decision making by the Australian Government and key research-users.

The aim is to make all project generated data products and reports publicly available. Each project should produce one or more data products that capture the key outcomes of the project in a form and format suitable for display in the e-Atlas.

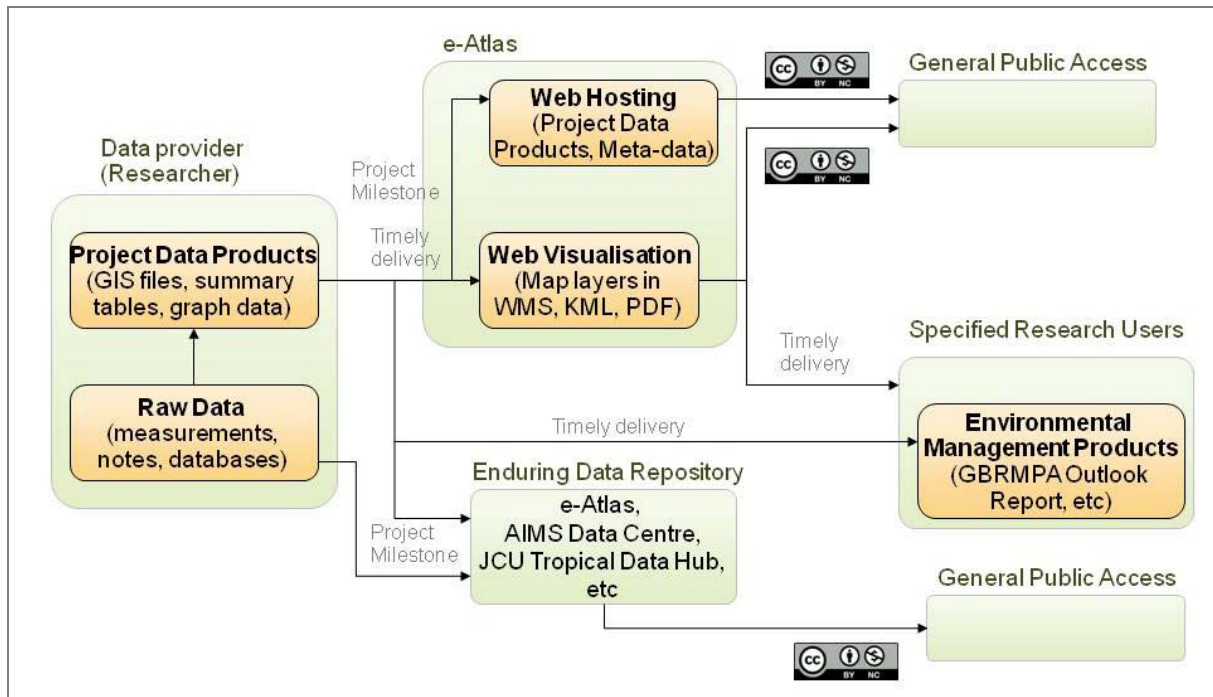


Figure 1: Diagram showing the flow of research data from data providers through to research users as described by the Data Management Protocol. Research results should be available to key research users in a timely manner. Sensitive products may be limited to key research users using an access control system in e-Atlas. Raw data must be housed in an enduring data repository and discoverable through compliant meta-data descriptions deposited in e-Atlas. Some datasets will be visualised on other websites (e.g. JCU Tropical Data Hub) with those outputs also discoverable on e-Atlas through active links from the Project Summary.

Licensing and badging of project material

Licensing is important to ensure that those who have obtained a dataset know what they can do with the dataset and how they should handle the data and its use. Badging is to ensure that work is properly attributed. Many historical datasets do not have any licensing information attached to them, effectively preventing their use for most purposes, reducing their impact.

All research data products and information should be released using a Creative Commons – Attribution Non-commercial 3.0 Australia License.

All data and visualisation products produced by the e-Atlas will be released using a creative commons attribution license (<http://creativecommons.org/licenses/by-nc/3.0/au>). These data products will be attributed to the original sources and the NERP and identified by appropriate logos or credit lines. The e-Atlas logo will appear only on products where the e-Atlas software is producing the visualized output from raw data.

Intellectual Property

Intellectual Property is addressed in Clause 11 of the Head Contracts with research providers. Research providers should refer to their contracts for specific detail.

Maintaining the opportunity to publish results and data

This Protocol recognises that opportunity must be provided to researchers to publish the results of their NERP funded research. While it is the intent that all research outputs will be publicly available on websites with a persistent or permanent link under a Creative Commons – Attribution Non-commercial 3.0 Australia License, release of the data underlying these products to someone not part of the NERP TE Hub will be managed on a case by case basis so as to maintain the opportunity for NERP researchers to publish research outcomes. Throughout the life of the Hub and where possible, this will include the consent of the Project Leader.

B. Capturing project metadata

The Hub Administrator will ensure the e-Atlas captures ANZLIC compliant metadata (ISO19115 MCP) for each research project funded by the NERP TE Hub. Under the NERP, a new metadata repository will be established for e-Atlas (based on ANZ-MEST and AIMS Metadata viewer software) which will allow its metadata records to be exported to Research Data Australia. Each metadata record will be presented in a user-friendly manner by using the AIMS Metadata viewer and will be discoverable through Google. These metadata records will describe the research data, but not its interpretation. The interpretation of the research data will be captured in the form of research summary pages (see **Attachment 3**) and project research reports available through the NERP TE Hub website

The current ANZLIC-compliant metadata template (**Attachment 1**) was developed in conjunction with ERIN and reviewed by them for compliance prior to implementation.

C. Data storage in a managed, enduring repository

All project derived data (including raw data) must be stored in a managed, enduring repository (e.g. e-Atlas, JCU Tropical Data Hub, AIMS Data Centre) to ensure that these data are available for re-use under the specified licensing conditions in perpetuity. The Protocol recognizes that many research provider institutions involved in the NERP TE Hub have their own managed data storage facilities, and will prefer to use their own facilities. In such cases, raw data files must be discoverable from the e-Atlas through active links contained as part of the Project Summary.

e-Atlas: A repository for project derived data

The e-Atlas was developed by the Marine and Tropical Sciences Research Facility (MTSRF) to capture and communicate research outcomes for north Queensland funded by the Commonwealth Environment Research Facilities (CERF) Program of the Australian Government, and it will continue to serve the same function for research from the NERP TE Hub, which is supported by the successor funding program (the National Environmental Research Program, NERP).

The following links show some examples of the existing system:

Front page: <http://e-atlas.org.au/>

Dataset page: <http://e-atlas.org.au/content/gbr-jcu-bathymetry-gbr100>

Mapping system (showing water quality data): <http://maps.e-atlas.org.au/mmp/>

The e-Atlas is a website, mapping system, and set of data visualisation tools for presenting research data in an accessible form to allow greater use of this information. Its primary goal is to provide awareness of what research has been done at a given location and/or on a given topic, and to provide visualisations (maps) of key datasets to support the work of environmental managers. Its secondary goal is to provide, where possible, open access to research data and their associated visualisation products, to the general community.

Presently, research content can be presented in the e-Atlas using images, diagrams, maps (online interactive maps, offline PDF maps, Google Earth maps) and text articles. Content is generally available publicly, although the e-Atlas will support access controls to allow sensitive research results to be shared with management agencies, prior to general publication of the content. Examples might be data containing private or commercial information and/or matters with cultural sensitivity.

The e-Atlas development and management team will continue to collaborate with other knowledge management initiatives including the Australian Ocean Data Network, Tropical Data Hub, Atlas of Living Australia, Research Data Australia, eReefs, and the Torres Strait Traditional Ecological Knowledge system to ensure that the e-Atlas utilises and complements these initiatives.

The e-Atlas is hosted at the Australian Institute of Marine Science (AIMS) and backed up as per the AIMS IT Disaster Recovery and Business Data Continuity Plan. AIMS has agreed to continue the hosting of e-Atlas after the completion of the NERP TE Hub (December 2014). At that point, e-Atlas will be a complete legacy system for all research by the MTSRF and NERP TE Hub.

E. Data Exchange

This Protocol encourages data exchange between projects and related programs. The e-Atlas and the Hub website will act as a portal to facilitate data exchange between researchers and identified research-users. This Protocol should not limit the free exchange of data among researchers with the authority to exchange data.

Attachment 1: Metadata template

The template provided below is a summary of the key information required by the e-Atlas in-order for the ISO19115 MCP standard records to be created. The full meta-data records will be prepared by the e-Atlas meta-data coordinator. For more information about the complete list of fields please consult the standard.

Field	Description
Title	Short descriptive title of the dataset being recorded.
Citation and responsible party information	Contact information for each of the custodians of the data. This is a list of all the individuals involved in the capturing and processing of the data. This should include the name, organisation, position, contact info and their role (such as custodian, owner, author, distributor, etc)
Point of Contact	Who should be contacted to obtain access to or more information about the dataset.
Data summary	Text summary of the dataset. This text should describe the nature of the data, its collection method and subsequent processing in sufficient detail to allow its reuse by other potential researchers. In general this summary does not include an interpretation of the data.
Preview Image	Graphic that provides an illustration of the dataset and matching caption text.
Data lineage	Information about the events or source data used in constructing the datasets, including a general explanation of the producer's knowledge of the lineage of the dataset.
Data file description*	This is a description of the data files themselves and should include a description of each attribute and any codes or acronyms used in the data. If the data is complex (such as a database) it should include a general description of each table and their relationships. This field is intended to be used by someone who has obtained the dataset and needs to interpret it.
Spatial Extent	Regional extent of the dataset. For data collected at sites this should correspond to the locations of each site and a short description of the data collected at this site.
Temporal extent	Data collection period
Vertical extent	Height or depth associated with the data (if applicable)
Maintenance and Update Frequency	Indicate whether the data collection has been completed or is ongoing. If it is ongoing then please indicate update frequency. Also indicate whether the data is from one-off surveys or repeated surveys.
Resource Constraints and licensing	Describe any use limitations, access constraints and other intellectual property issues.
Processing*	Description of any processing steps applied to the original source of data. This field is only applicable for datasets derived from other datasets. The original data source should be described in the Data

Field	Description
	lineage field.
References	Enter references for publications directly related or derived from this dataset.
Supplemental information	This should include any other key information not captured in the other fields.
Online resources	Any associated content, including reports, data downloads, articles, maps etc.

* This is a non-standard field that will be used by the e-Atlas team in managing the data. It will be made available through the meta-data record as a linked document.

Attachment 2: Study site template

Each project is required to submit information about their study sites or study region. This should be submitted for each dataset associated with the project and be linked to a corresponding meta-data record. This information will be used to enhance the spatial searching of the meta-data records and for the creation of a map of all study sites covered by NERP TE Hub projects.

Projects that have little or no spatial component to the research are not required to submit the study site template. Projects that have point study sites should use the template provided below. Those that have study regions should submit the information using a Shapefile or other suitable GIS format.

The following is a draft of the study site template. This template will be updated based on further discussions with researchers and research end-users. The study site information should be submitted as a spreadsheet with the columns detailed below.

One use of this data will be the creation of a map of study sites covered by NERP TE Hub projects. On this map each site will appear as a point and clicking on these sites will display a popup displaying the information supplied in the Description, Measurements and Image fields. Survey sites will be able to be filtered based on keyword searches from the description and measurement fields as well as additional information obtained from the associated meta-data record for the dataset.

Field	Description
Name (optional)	Name of the site (if it has one). This will be displayed along side the point marking this site.
Latitude	Latitude of the site in decimal degrees (-19.2678)
Longitude	Longitude of the site in decimal degrees (147.0548)
Measurements	Brief description of the parameters or measurements taken at this location. This will often be the same for every location. For example: surface temperature (deg C), salinity (PSU), hard coral cover (%)
Description (optional)	General description associated with the site. This corresponds to any information you would like someone to see about the site's popup box.
Category (optional)	If the study has different types of study sites (such as half the sites measured temperature and half the sites measure temperature and salinity) then specify this grouping with the Category attribute. Each category will be assigned a distinct icon and the categories will become items in the map legend. For the example above a suitable set of categories might be: "Temperature" and "Temperature and Salinity".
Image (optional)	Name of a picture to associate with the location. This could be a photo of the location or a diagram showing a summary of results from the location. The picture files should be supplied with the spreadsheet. This picture will be displayed in any popups associated with

The following information will automatically be attached to study site information from the associated meta-data page: institution, custodian, project page, meta-data page, temporal extent. This information does not need to be repeated in the site description.

Attachment 3: Project Summary Template

Each project is required to submit as part of their final year reporting a brief summary of key research outcomes suitable for the creation of a project page in the e-Atlas. This summary will focus on plain English descriptions of the key research outcomes and knowledge generated from the project to date. This summary will provide additional context for the project meta-data records (which do not capture interpretation of the data) outlining the key research findings and the interpretation of data products. These pages will allow research end users to quickly assess the current research results, whilst providing access to all of the project documents (i.e. reports, meta-data, data products and maps).

The form of this template is still in development.

Glossary

Project derived data Project raw data and data products.

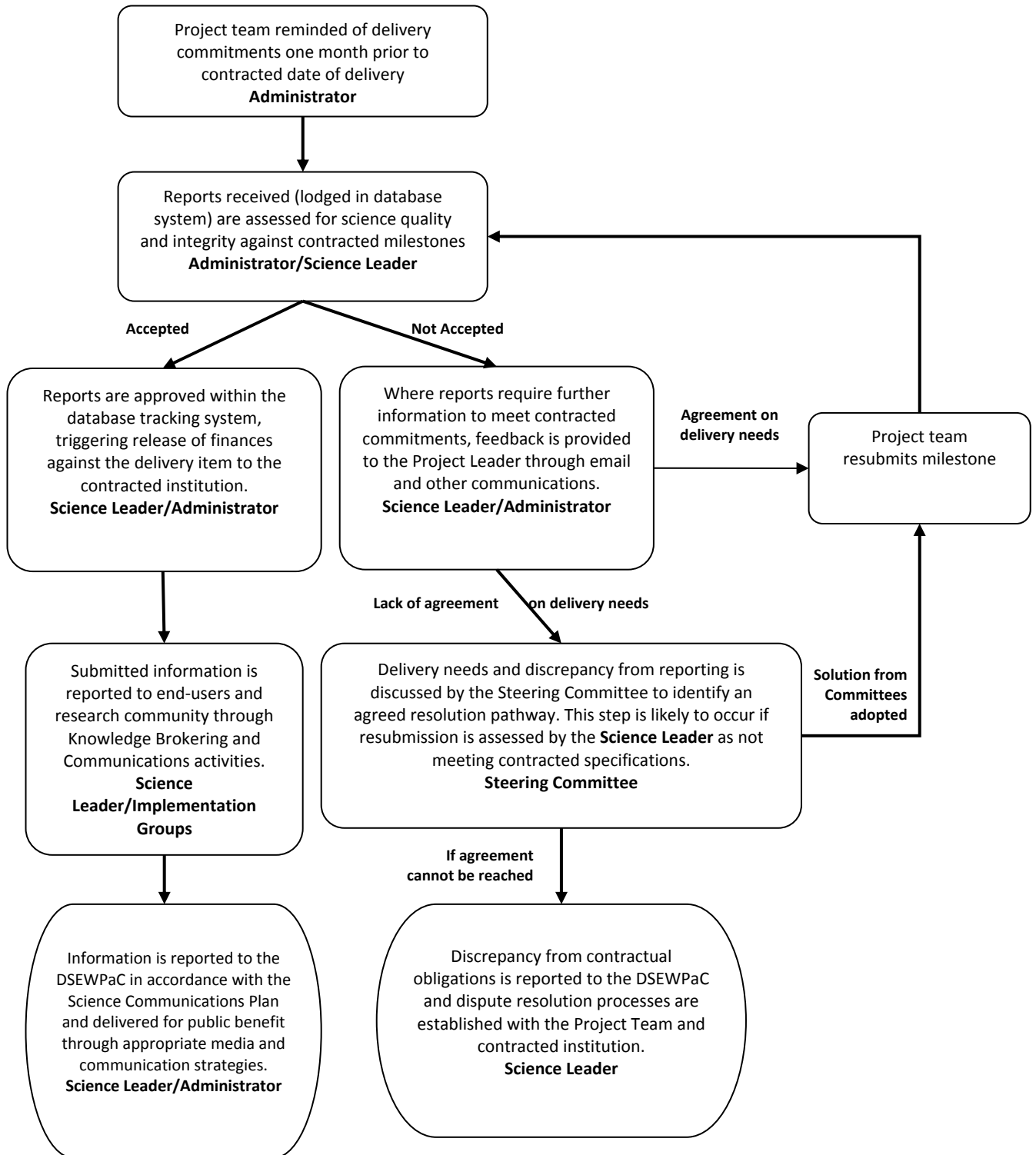
Project data products Products capturing the interpreted results of the research. These are derived from the raw data by appropriate processing applied by the researchers. These products are typically a summary of the raw data and are typically easier to understand and reuse. An example of a project data product would be an interpolated bathymetry grid, where the raw data is individual depth soundings from various sources. Data products include GIS files, graphs and tables that are used in reports to highlight outcomes of the research.

Raw data Measurements, notes and databases used to collect the primary research data. This data typically has little or no interpretation applied to it.

Compliant metadata Meta-data describing each of the project datasets following the ISO19115 standard.

End of Attachment A Data Management Protocol

Appendix B: Diagram of processes, and roles and responsibilities within the post-contracting QA/QC framework and project management system for the NERP TE Hub



Appendix C: Template – NERP Team Feedback on Hub Biannual Progress Reports

This form is to be provided back to the research Hub contact within 3 weeks of the milestone report being delivered. It is intended to provide helpful feedback to the Hubs to facilitate continuous improvement. To that end feedback should be helpful and meaningful. The primary feedback should be against project milestone reporting. Secondary feedback should be against Key Performance Indicators. Depending upon the stage of the Hub’s lifespan there may be nothing to comment upon some of the KPIs. Ideally this form should be no longer than 3 pages when completed.

Section 1. Reviewer

Review approver:

Contact telephone number:

Contact email address:

Feedback date:

Section 2. Report information

Hub Name (full activity title):

Report Contact:

Report/ milestone details:

Report due date:

Report submission date:

Payment amount:

Section 3. Feedback

- A. Report – General comments**
- B. Project Milestone Reporting**
- C. Key Performance Indicators**
 - i. Systems Establishment Phase
 - ii. Outputs Delivery Phase
 - iii. Project Impact Phase
- D. Financial reporting**
- E. Communications activities**
- F. Other comments**